Claims:

1. A method of making a plant artificial chromosome, comprising:
(a) preparing recombinant protoplasts of a first plant species containing an exogenous nucleic acid;
(b) producing chromosome fragments of chromosomes contained in the recombinant protoplasts;
(c) fusing the recombinant protoplasts of (b) with protoplasts of a second plant species to produce fused protoplasts, wherein the first and second plant species may be the same or different; and
(d) identifying fused protoplasts of (c) or cells derived from the fused protoplasts of (c) that contain chromosome fragments that exhibit normal plant chromosomal properties.
2. The method of claim 1 wherein (b) comprises irradiating the protoplasts.
3. The method of claim 1 wherein (b) comprises contacting the protoplasts with a chemical agent.
4. The method of claim 3 wherein the chemical agent is calicheamicin, esperamicin, dynemicin or neocarzinostatin.
5. The method of claim 1 wherein said identifying of (d) comprises pulsed field gel electrophoresis.
6. The method of claim 1 wherein said second plant species is the same as said first plant species.
7. The method of claim 1 wherein said second plant species is a member of the same family as said first plant species.
8. The method of claim 1 wherein said first plant species is a monocot.
9. The method of claim 1 wherein said first plant species is a dicot.
10. The method of claim 1 further comprising (e) regenerating a whole plant from the recombinant protoplasts of (a), prior to (b).
11. The method of claim 1 further comprising (f) regenerating a whole plant from the fused protoplasts or plant cells identified in claim 1(d).

12. The method of claim 1 wherein the exogenous nucleic acid comprises at least one recombination site.

13. The method of claim 1 wherein the exogenous nucleic acid comprises at least one restriction site.

14. The method of claim 1 wherein the exogenous nucleic acid comprises at least one coding region.

15. The method of claim 1 wherein the exogenous nucleic acid comprises at least one sequence encoding a yeast chromosomal element.

16. The method of claim 1 wherein the exogenous nucleic comprises a yeast artificial chromosome.

17. The method of claim 1 wherein the exogenous nucleic acid comprises a sequence encoding a selectable marker.

18. A method of preparing a transgenic plant comprising:

(a) preparing recombinant protoplasts of a first plant species containing an exogenous nucleic acid;

(b) producing chromosome fragments of chromosomes contained in the recombinant protoplasts;

(c) fusing the recombinant protoplasts of (b) with protoplasts of a second plant species to produce fused protoplasts, wherein the first and second plant species may be the same or different;

(d) identifying fused protoplasts of (c) or cells derived from the fused protoplasts of (c) that contain chromosome fragments that exhibit normal plant chromosomal properties; and

e) regenerating a whole plant from the protoplasts or cells identified in (d) that contain said chromosome fragments exhibiting normal plant chromosomal properties.

19. A method of making a plant artificial chromosome, comprising:

(a) producing transformed plants of a first plant species containing an exogenous nucleic acid;

(b) producing chromosome fragments of chromosomes of said first plant species;

(c) crossing said first plant species containing the chromosome fragments with a

second plant species to produce hybrid plant species wherein said first and second plant species may be the same or different; and

(d) identifying hybrid plant species of (c) or cells or protoplasts thereof containing at least one chromosome fragment that exhibit normal plant chromosomal functions.

20. Isolated plant cells or protoplasts containing at least one plant chromosome fragment exhibiting normal chromosomal properties produced by the method of claim 1.

21. A culture of protoplasts or plant cells identified in claim 1(d).

22. A whole plant produced by the method of claim 11.

23. The whole plant of claim 22 that is a monocot plant.

24. The whole plant of claim 22 that is a dicot plant.

25. Seed derived from the whole plant of claim 22.

26. The whole plant regenerated by the method of claim 18.

27. A plant cell culture derived from the whole plant of claim 25.

28. Seed derived from the whole plant of claim 26.

29. A hybrid plant species or cells or protoplasts thereof containing at least one chromosome fragment that exhibits normal plant chromosomal functions, produced by the method of claim 19.

30. A recombinant nucleic acid comprising a first centromeric sequence functional in a plant cell and a second centromeric sequence functional in a yeast cell.

31. A recombinant vector comprising the nucleic acid of claim 30.

32. The recombinant vector of claim 30 that is a shuttle vector.

33. A recombinant cell comprising the nucleic acid of claim 30.

34. The recombinant cell of claim 33 which is a plant cell.

35. The recombinant cell of claim 33 which is a yeast cell.